

What is claimed is:

1. A method for improving utilization in a peer-to-peer network, the method comprising:
 - allocating one or more storage slots at each node in the peer-to-peer network, a first portion of the storage slots allocated for storage zones and any remaining storage slots at each node allocated as a free slot reserve;
 - inserting data into the storage zones; and
 - when a storage zone reaches its full capacity,
 - splitting the data in the storage zone into a first and second portion,
 - allocating a free slot reserve storage slot as a new storage zone, and
 - transferring the second portion of the data to the new storage zone.
2. The method of claim 1 wherein each node is allocated more storage slots than its actual physical capacity.
3. The method of claim 2 wherein each node is allocated $N - 1$ virtual slots for each N storage slots allocated.
4. The method of claim 2 wherein a storage zone at a node is transferred to another node in the peer-to-peer network if the data inserted into the storage zones at the node fills the actual physical capacity of the node.
5. The method of claim 4 where a local search for candidate nodes in a transfer set is conducted prior to transfer of the storage zone.
6. The method of claim 1 wherein the new storage zone is transferred to a free slot reserve on a different node when the storage zones hosted at the node exceeds the slots allocated at the node.

7. The method of claim 6 where a local search for candidate nodes in a transfer set is conducted prior to transfer of the new storage zone.
8. The method of claim 1 wherein the data is associated with hashkeys of a hash function and where each storage zone is responsible for a subset of all hashkeys.
9. The method of claim 7 wherein the hashkeys are uniformly distributed by the hash function.
10. The method of claim 1 wherein the storage slots are of a fixed-size.
11. A method for improving utilization in a peer-to-peer network, the method comprising:
 - allocating one or more storage slots at each node in the peer-to-peer network, a first portion of the storage slots allocated for storage zones and any remaining storage slots at each node allocated as a free slot reserve; and
 - when a new node is added to the peer-to-peer network, transferring at least one storage zone from another node in the peer-to-peer network to the new node so as to maintain at least one storage slot at each node in the peer-to-peer network.
12. The method of claim 11 wherein the storage zone at the another node is eagerly split into a first and second portion with the second portion transferred to the new storage zone at the new node.
13. The method of claim 12 wherein each node maintains no more than one eagerly split zone.
14. The method of claim 11 wherein the another node has two or more storage zones and one of these storage zones is transferred to the new node to become the new storage zone on the new node.

15. The method of claim 11 wherein a search is conducted among a local set of nodes in the peer-to-peer network for a storage zone to transfer to the new node.
16. A node for a peer-to-peer network, the node maintaining a number of slots for storage of objects in the peer-to-peer network where the number of slots exceeds the node's actual physical capacity.
17. The node of claim 16 where the number of slots maintained by the node is equal to $2 \times N - 1$ where N is a number of slots that would fill the node's actual physical capacity.
18. The node of claim 16 where the objects stored in a slot at the node are transferred to another node in the peer-to-peer network if the objects inserted into the slots at the node fills the actual physical capacity of the node.
19. The node of claim 16 wherein the objects are associated with hashkeys of a hash function and where each node is responsible for a subset of all hashkeys.
20. The node of claim 16 wherein the slots are of a fixed-size.